

HYDROGEN ENRICHMENT SCHEME FOR AUTOTHERMAL REFORMING

Abstract of Disclosure

Recycling a portion of autothermal reformer effluent into the steam-hydrocarbon feed stream with a thermo-compressor ejector is disclosed, using the preheated feed mixture as motive fluid. Syngas recycle-motive fluid molar ratios are 0.2–1.0, selected to optimize the overall configuration. The recycle introduces hydrogen and steam into the feed, and elevates the feed temperature, for operating the reformer in a soot-free regime. There is some pressure drop between the raw feed steam-natural gas mixture and the reformer feed, which requires the raw feed mixture to be supplied at a higher pressure, but this is offset by the lower pressure drop in the process heater and other upstream and downstream equipment due to lower quantities of steam. The feed pre-heater can have a lower duty, and the upstream and downstream equipment can be reduced in size, while the size of the autothermal reformer is about the same compared to the size needed for operation without effluent recycle.

Figures